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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No 131

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NUCLEAR DEVELOPMENT AND PROLIFERATION

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CONTENTS

OPERATIONS OF RAJASTHAN NUCLEAR PROJECT REVIEWED

Madras THE HINDU in English 25 Dec 81 p 8

[Article by N. N. Sachitanand]

[Text]

THE Rajasthan Atomic Power Project at Rawatbhata near Kota is again in the news, this time for a shutdown of its first unit due to a cooling water leakage problem in the endshield. The coverage on this has been so confusing and full of technical half-truths that facts on RAPP have been sought from the horse's mouth.

Given below is an account of the atomic power project's history and performance as furnished by Dr M. R. Srinivasan, Head of the Power Projects Engineering Division of the Atomic Energy Commission.

Although the first commercial nuclear power reactor to go on stream in India was of the boiling light water type supplied by General Electric of the United States, the Atomic Energy Commission decided to opt for the Canadian designed Candu type heavy water cooled and moderated reactor for the country's atomic power programme since the latter permitted the use of natural uranium as fuel. Production of enriched uranium needed for the [illegible] type light water reactor is prohibitively [illegible] and [illegible] intensive [illegible].

[illegible] when the first unit of RAPP was being designed, the only [illegible] with the Canadians [illegible] experimental 20 MWe facility [illegible] the Pickering [illegible]. The result was that [illegible] the development work had to be done for the first time here for RAPP [illegible] Indian scientists and engineers.

Turbine blade failure

One of the first breakdowns that occurred in RAPP-1 after it was commissioned was turbine blade failure. This happened on three different occasions. The Canadians, who had supplied the turbine generator, had themselves no experience of designing and making large turbine generators and had used a British design. This inadequacy in design and manufacture led to early blade failures.

A second cause of frequent outages in the early years of operation of RAPP-1 was the weak grid into which it was synchronised. At that time the Rajasthan grid had a capacity of only 500 MW and any overloading of this small capacity grid resulted in frequency drops which caused the RAPP turbine to trip. It was only after 1975-76, when the Bhakra and Rajasthan grids started operating in parallel that such trips have decreased.

In 1977-78, there was a prolonged labour agitation and strike at RAPP which not only contributed to difficulties in operating RAPP-1 but also resulted in serious problems when RAPP-2 was commissioned.

In spite of all these constraints, in 1979 RAPP-1 was operated at a capacity factor of 66 per cent and an operating factor of 82.5 per cent. (Capacity factor is actual power output as a percentage of theoretical output and operational factor is actual operating hours as a percentage of total available operating hours). In that year the production of power from the first unit was around 5,700 kWh per installed kW which is 80 per cent higher than the national average from the coal based thermal plants.

Leaking tubes

In 1980 RAPP 1 suffered two outages due to failure of tubes in the heat exchangers that cool the heavy water. The heat exchangers had to be taken out, the leaky tubes identified and plugged. This failure was not initially expected by the designers of the reactor. But it has been the international experience that, even if the heat exchangers are supplied as per standards and specifications, tube failures can be expected after a few years of service due to normal corrosion and wear.

The RAPP authorities have now instituted a regular in-service non-destructive inspection system of heat exchanger tubes. The leaking tubes or tubes that have become critically thin are identified and plugged.

Towards the end of 1980 there was a malfunction of a control system in RAPP 1 which led to a reactor trip and the initiation of an automatic safety procedure whereby the reactor and auxiliary equipment was doused by water from a tank located near the ceiling of the reactor building. This was something like a false fire alarm resulting in an automatic but needless water quench. As a consequence the reactor had to be again shut down until the mess was cleared up.

Despite the above outages in 1980 RAPP 1 operated at a capacity factor of 54 per cent, an operational factor of 74 per cent and a production average of 4 750 kWh per installed kW, still better than the national average for coal based thermal power plants.

In 1981 however RAPP 1 suffered a severe and unexpected setback when there was cooling water leakage in the endshield. The endshield of the RAPP 1 reactor is a massive water cooled carbon steel cap weighing 125 tonnes which acts as a radiation shield. There are two endshields, one for each end of the reactor. The RAPP 1 endshield was fresh fabricated at BHEL Bhopal from parts imported from Canada.

It must be emphasised here that the coolant in the endshield is ordinary water. There was no leakage of heavy water which is in the reactor proper. Nor according to Dr. Srinivasan was there any dangerously high radioactivity in the coolant water leaking from the endshield. All the water leaking from the endshield was contained within the reactor building itself.

Sealing operation

In an ingenious operation the RAPP authorities have managed to plug the leaks by circulating through the endshield cooling system a combination of sealing chemicals. The sealing operation which commenced on November 24 was expected to be completed by December 25 and the reactor brought back into operation by the year end.

Earlier the leaks were located *in situ* by sophisticated methods such as acoustic emission and helium leak detection. Making the best of a bad bargain, the RAPP authorities have combined this forced outage with the biannual maintenance shutdown of 10 weeks which they would have had to take anyhow.

Although the PPED, which Dr. Srinivasan heads, has not heard of any leakage in endshields of similar reactors in Canada, it is not taking any chances and the manufacturing methods of endshields as well as the material specifications, have been accordingly changed.

In fact, for the second reactor of the Madras Atomic Power Project, the endshield envelope will be of stainless steel. (Such technological improvements based on operating experience are an international practice known in nuclear power circles as 'backfitting.')

Because of the endshield problem the performance of RAPP 1 in 1981 was poor with a capacity factor of only 31.4 per cent, an operation factor of 51 per cent and energy production of 2 740 kWh per installed kW.

The second unit of RAPP became critical in October 1980 and was synchronised with the grid in November. It was however declared to be operating commercially from April 1981. The performance of the reactor has been satisfactory, though the figures (capacity factor 43 per cent, operation factor 79 per cent and energy output 3 760 kWh/kW) appear to belie that.

Low capacity factor

The low capacity factor is due to the fact that two of the heat exchangers for cooling the heavy water have a large number of their tubes plugged. The reactor has therefore been downgraded to 60 per cent of its rated capacity.

How were the two heat exchangers damaged? It was not, as some press reports speculate, due to any fault at the manufacturers' end. According to Dr. Srinivasan, the genesis of the damage can be traced back to the strike of 1977-78. During this period the officers who were testing these heat exchangers were pulled out to work on RAPP-1 since the operators went on strike.

It is surmised that the test water in the tubes of the heat exchangers, instead of being drained out, was left in them. This stagnant water led to bio-corrosion of the cupro-nickel tubes and to prevent their leakage they have had to be plugged.

The two new heat exchangers are ready but they cannot be fitted immediately since the reactor cannot be taken out this being the season of peak power demand. The programme is to replace the heat exchangers when the reactor is taken out.

for its annual maintenance of six weeks long outage in March-April next year.

Candu type reactors

The checquered history of the RAPP reactors may raise doubts about the choice of the Candu type of heavy water reactors for our atomic power programmes. But the fact is that among the best performing reactors of the world with capacity utilisation averaging 80 per cent and above at least half are the Candu type.

Actually in most developed countries the average capacity utilisation of nuclear power reactors is 60 to 70 per cent. If our nuclear power reactors give an average utilisation of 65 per cent, they will be more competitive in cost of power generation than coal based thermal power stations.

It is true that the capital needed for the Narora atomic power project in U.P. is stated to be around Rs. 7 500 to 8 000 per installed kW which is more than the Rs. 5 000 per installed kW needed for the coal based superthermal power stations. But then the fuelling and heavy water cost for a Candu type nuclear power station comes to only five paise per unit against 20 paise per unit for coal based thermal power stations.

No doubt there will be many who might question the wisdom of going in for nuclear power stations basing their fears on the performance of RAPP 1. But it has to be remembered that it was the first and was developed at a time when the technology was young. Then again our coal stocks, though large, are of poor quality.

Moving large amounts of coal is itself a gigantic problem. For bulk power there is no alternative to going nuclear especially for plants distant from coal deposits. The alternative energy sources can at best be supplementary and suited for distributed small consumers.

India has a programme to install 10 000 MWe of nuclear power by the end of this century. This will consist of 10 reactors of 235 MWe and 12 reactors of 500 MWe. This capacity is in addition to that already slated for Narora and Kalpakkam.

Gestation period

The gestation period for a nuclear power station in India today is around 10 years. For the Kankrapara unit in Gujarat, the latest station sanctioned, the schedule is 9.5 years for the first unit and another year for the second unit.

According to Dr. Srinivasan this gestation period can be reduced to 8.5 plus one if the designs are standardised, imports procured in bulk and the orders to the suppliers bunched. But this requires the commitment to a significant number of reactors at the same time by the Government. The one-by-one approach will only mean delays and rising costs.

Fears have also been expressed about the problem of disposal of radioactive wastes from nuclear reactors. According to Dr. Srinivasan, processes are now available for converting voluminous highly radioactive wastes into small volume solids which can be tucked away underground without occupying much space.

Over the last two decades a tremendous strength in designing, manufacturing and running nuclear power plants has been developed. This expertise has been acquired not only by the Atomic Energy Commission but also the Indian engineering industry. It would be folly to throw all this away just because of some initial setbacks in the first plant. The worth of a whole programme cannot be judged by the performance of a single unit.

NUCLEAR EQUIPMENT NOT BEING PROPERLY MAINTAINED

Kuala Lumpur BUSINESS TIMES in english 20 Nov 81 p 2

[Text]

NUCLEAR instrumentation in various Malaysian institutions are not being properly used or maintained.

Encik Razali Hamzah, an official of Puspati, the national nuclear research centre in Bangi, said the problems included lack of skilled staff, unavailability of spare parts and data books, organisation structure and environmental conditions.

Presenting a paper at the seminar on nuclear energy for industry, Encik Razali said the institutions which use nuclear instrumentation include the General Hospital, Universiti Pertanian, University of Malaya and Universiti Kebangsaan.

A survey conducted by Puspati in 1979 found that most of the institutions either had no proper division looking after the instrumentation or had very poor services.

The lack of an adequate budget allocation for maintenance indicated that the management has not placed enough emphasis on the need to take care of the performance and use of the instrumentation.

This could have serious consequences. Research work could be interrupted and patients' lives could be jeopardised by breakdowns of medical instrumentation.

The survey noted that maintenance staff tended to be recent school leavers or other people not familiar with instrumentation repair. Qualified personnel usually left for better paying jobs in the private sector, he noted.

The survey also found that users of nuclear equipment were unaware of its reliability and performance before they purchased it.

After sales service from local agents were either poor or non-existent. Most of the agents lacked workshop facilities and maintenance staff. It was believed that foreign manufacturers and the agents were not motivated to give these services due to the relatively low sales volume here.

Encik Razali said Puspati was making plans to tackle these problems at two levels.

First it proposed to attack the immediate problems of maintenance by training more staff in maintaining, servicing and testing equipment. It was also looking at ways of getting supplies of components faster.

Secondly, as a long term target, Puspati was studying the ways of building up manufacturing capability of nuclear instrumentation in the country.

Engineers and scientists at Puspati would have to be trained in designing and making common as well as sophisticated instrumentation.

Encik Razali said the best solution would be to create a national instrumentation centre.

In fact Puspati has established a division to cater for the nuclear instrumentation problems but its services were currently limited to nearby institutions in Kuala Lumpur. The major complex was still under construction.

BRIEFS

NUCLEAR ENERGY CONFERENCE SCHEDULED--Port of Spain, Trinidad, 29 Dec (CANA)--Guyana, Venezuela, and Cuba have been instrumental in getting the United Nations General Assembly to decide on holding a big conference on nuclear energy, according to a statement from the U.S. Information Centre here. The three were among 26 countries which sponsored a resolution calling for the convening of a conference for the promotion of international cooperation in the peaceful uses of nuclear energy. Other sponsors included Argentina, Bangladesh, Chile, Colombia, Ecuador, Egypt, Ghana, Indonesia, Mali, Mexico, Morocco, Nigeria, Pakistan and Peru. The conference will be held in Geneva from 20 August to 9 September 1983. [Text] [FL291227 Bridgetown CANA in English 0930 GMT 29 Dec 81]

CSO: 5100/2076

BRIEFS

NUCLEBRAS BUDGET ALLOCATIONS--Thirty-two percent of the 192.7 billion cruzeiros in this year's NUCLEBRAS budget will be spent abroad through loans for the purchase of equipment. That percentage represents 63.5 billion cruzeiros. Another 38 billion cruzeiros will go to servicing the foreign debt, which currently stands at $600 million. The nuclear plants in Sao Paulo (Iguape) will be allocated 12 billion cruzeiros; and Angra 2 and 3, 86.7 billion cruzeiros. Of the sum allocated to Angra, more than 50 billion cruzeiros will be spent in equipment purchases abroad. The 1982 investment budget has been increased by 8 percent in real term over last year's 95 billion cruzeiro budget. In the construction of four nuclear plants--of which only the construction of the infrastructure for one has been started--98.7 billion cruzeiros will be spent. To the fuel cycle--with the installation of several units ranging from the production of uranium concentrates to the manufacture of fuel elements--48.7 billion will be allocated. This is the second largest investment following that in the nuclear plants. The third largest allocation will go to service the company's debt. Personnel training and technological infrastructure are budgeted with 9.7 billion; mineral prospecting and research with 3.6 billion. [Text] [PY210207 Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Jan 82 p 18]

NUCLEP CAPITAL STOCK INCREASED--A decree signed by President Figueiredo has authorized raising the ceiling on the capital stock of NUCLEP [Nuclebras Heavy Equipment, Inc], a subsidiary of NUCLEBRAS. Capital stock will rise from 2,198,011,807 cruzeiros to 8,225,000,000 cruzeiros. [Text] [PY110151 Brasilia Domestic Service in Portuguese 2200 GMT 8 Jan 82 PY]

CSO: 5100/2078

BRIEFS

URANIUM MINE THEFT--Windhoek--Police in Windhoek were holding four men in connection with the theft of a small quantity of uranium oxide from the Rossing uranium mine near Swakopmund, the District Commandant of the Windhoek CID, Chief Superintendent Alan Collins, said yesterday. About three kg had been seized by police and it was thought the highly toxic black powder had been stolen in small amounts from the processing plant at Rossing. "It appears the uranium oxide is being collected and offered for sale on a non-existent market." There was little danger of radioactivity from the substance, but it was "particularly poisonous", Chief Superintendent Collins said. Uranium oxide is the final product from the Rossing mine and needs further processing before it provides fuel for nuclear power stations. Rossing's public relations officer, Mr Clive Algar, said in Windhoek yesterday it was possible that some uranium oxide--perhaps a teaspoonful at a time--was being smuggled out of the mine. "But the oxide is of such low radio-activity that a small amount would not register on a geiger counter" and would be difficult to detect. Strict security made it impossible for large quantities to be removed, Mr Algar said. [Text] [Johannesburg THE CITIZEN in English 22 Dec 81 p 12]

CSO: 5100/5613

Johannesburg THE CITIZEN in English 19 Dec 81 p 3

[Text]

PARIS — South Africa has supplied enriched uranium to be turned into fuel elements in France for the first French-built South African nuclear power reactor, French company officials said yesterday.

The fuel elements will be used to start up South Africa's first nuclear power station at Koeberg, near Cape Town, 12 months from now.

Framatome, leader of a French consortium building the station, said the plant had undergone successful circuit pressure tests and should go into industrial production in December, 1982.

"The South African Electricity Supply Commission (ESCOM) has sent us a first consignment of enriched uranium which we are turning into fuel elements in accordance with our contract," Framatome's Director-General, Mr Jean-Claude Leny said.

"How South Africa obtained that uranium is none of our concern." But he added that the French Government had given Framatome permission to process it, indicating the uranium had been brought through a regular trading company and was covered by the Vienna-based International Atomic Energy Agency.

South Africa turned to the international market in 1978 when the US Administration banned the export of enriched uranium until Pretoria signed the nuclear non-proliferation treaty.

According to French industrialists, South Africa must have paid around R80-million for the 75 tons of enriched uranium needed for conversion into fuel elements for the plant.

Mr Leny declined to comment on French Press reports that the enriched uranium for Koeberg could have come from the Eurodif gas diffusion plant, in the Rhone valley of central France.

Eurodif was built as a five-nation venture, using French technology, but with each country owning a share of the plant and taking a similar share of its output.

The original shares were: France 42 percent, Italy 25 percent, Belgium 11,11 per cent, Spain 11,11 per cent and Iran 10,78 per cent.

Shareholders are allowed to sell surplus enriched uranium under international controls and guarantees that it will only be used as fuel in nuclear power stations and not for military purposes, Eurodif officials said.

The uranium is enriched at only 3 per cent and is thus not of weapons grade, one official added.

Loading of the nuclear fuels at the R88-million station should begin next September. The reactor is expected to go "critical" shortly afterwards and start generating electricity before the end of 1982, Mr Leny said.

Construction of the first unit, which began in 1976, was on schedule. Work on the second unit, due to go into production at the end of 1983, was ahead of schedule.

WASTE DISPOSAL SEEN AS OBSTACLE TO NUCLEAR PROGRAM

Duesseldorf WIRTSCHAFTSWOCHE in German 20 Nov 81 p 26

[Article: "No Less Than a Provocation"]

[Text] Predictions of consumption by 1995, upon which the FRG's energy program is based, are already being called into question. Problems of nuclear waste disposal are still unresolved.

The mathematical jugglers of the institutes participating in the third projections of the FRG's energy program are optimistic. By 1995, nuclear power, as a percentage of primary energy use in the FRG, is expected to increase four-fold from its present 4 percent. Such at least is seen as a possibility by [illegible] at the German Institute for Economic Research in Berlin, the Institute for Energy Economics in Cologne and the Rhineland-Westphalian Institute for Economic Research in Essen. To attain that goal one to two large-scale power installations of the Biblis type will have to be put on line each year.

Yet what the scientists consider as being within the realm of possibility [illegible], according to the SPD's energy expert, Ulrich Steger, "substance in reality [illegible]." The chairman of the SPD parliamentary caucus sees the statistical projections as no less than a provocation." There are still too many unanswered questions concerning the future role of nuclear power. Says Steger, "the threat to nuclear power does not come just from citizens' initiatives, but also from the question of nuclear waste disposal." Because the Nuclear Power Law has, since 1976, been amended by a provision that only permits the construction and operation of nuclear power stations after the question of waste disposal has been dealt with. Nonetheless, this exists only on paper in the FRG.

At the moment there is only the prototype of a recycling plant at the nuclear research center at Karlsruhe. The quick breeder, which is to use [illegible] plutonium from recycling installations, can, in any event, only produce power in the next century as a demonstration project. Interim storage is also controversial since the fuel is only to be put in interim storage if a permanent storage depot exists. And a permanent storage depot for nuclear waste still does not exist in the FRG.

For the chairman of the German [illegible] Guenther H. Scheuten, [illegible] is already at the [illegible]. For many nuclear opponents such statements are [illegible]

[illegible]

[illegible] FOR NUCLEAR SAFETY

[illegible] in France [illegible]

Decree No. 81-[illegible] of [illegible] May 1981 on creation of a Higher Council for Nuclear Safety, signed by Prime Minister Pierre Mauroy and Minister of Industry Pierre Dreyfus

The Prime Minister,

Considering the report of the Minister of Industry,

In view of Decree No. [illegible] of [illegible] March 1973, amended by Decree No. [illegible] of [illegible] June 1977, on the establishment of a Higher Council for Nuclear Safety and a Central Department for the Safety of Nuclear Installations;

Decrees:

Article 1 [illegible] of the decree referred to above is superseded by the following provisions:

Article 1

A Higher Council for Nuclear Safety is created, attached to the Minister of Industry.

[illegible] the safety of [illegible] technical [illegible] from the [illegible] accidents and [illegible]

[illegible] Minister of Industry [illegible]

[illegible] opinions to the minister of industry about all important questions concerning nuclear safety, as well as about the scientific and technical quality of the measures envisaged to keep people well informed in this field.

In addition, the National Assembly, the Senate, the regional or general councils involved or, if necessary, the specialized committees set up by them can request the minister of industry to submit for the council's consideration all important questions regarding these subjects.

The council evaluates the overall results of efforts in the field of nuclear safety and sends an annual report on its activities to the minister of industry.

Article 3.—Article 2 of the decree referred to above is superseded by the following provisions:

Article 2

Besides the president, the Higher Council for Nuclear Safety includes:

The high commissioner for atomic energy, vice president;

A member of the National Assembly;

A member of the Senate;

Twelve persons selected because of their scientific, technical, economic or social qualifications;

The general director of the French Electric Company or his representative;

Six members of representative trade unions;

Four representatives of associations whose purpose is to protect nature and the environment, nominated on the recommendation of the High Committee for the Environment;

The secretary of state, chairman of the Interministerial Committee for Basic Nuclear Installations;

The general secretary of the Interministerial Committee of Nuclear Safety;

The director of civilian safety in the Ministry of the Interior and Decentralization;

The director of the general delegation for scientific and technical research in the Ministry of Research and Technology;

FRANCE

[illegible] TEST SITE CALLED 'RADIOACTIVE SWISS CHEESE'

Paris LE POINT in French 14 Dec 81 p 53

[Article by Roland Mihaill: "Mururoa: The Volcano is losing its footing"]

[Text] A series of controversies have arisen about Mururoa Atoll. While the prime minister of New Zealand, Robert Muldoon has just announced the official filing of a request for an inquiry with the French government and a sailing ship of the Green Peace Environmental Organization, with Brice Lalonde on board, approaches the archipelago, now on their part, CFDT [French Democratic Confederation of Labor] engineers of the AEC [Atomic Energy Commission], observe more and more alarming reports about the safety of the Pacific Nuclear Test Center. Their findings are startling: The atoll could be about to become a genuine "radioactive swiss cheese."

That is an old story. Previously, in August 1979, the CFDT, the majority union among the civilian personnel in Mururoa, reported that the atoll had experienced two accidents, within a few days, which the French authorities then called "incidents." A scientific inquiry commission had, moreover, afterwards recognized that the mini-tidal wave which had submerged some of the center's installations on 25 July 1979 had indeed been caused by an underwater collapse following an underground explosion which failed--with the bomb being wedged in its lowering shaft. Likewise, these authorities had also admitted at the time that an explosion in an experimental bunker had caused the death of two men and burned six other technicians.

Last October, the CFDT continued and signed. Violent storms in March 1981 reportedly removed in the very contaminated areas of the atoll, those where the outdoor firings formerly took place, large areas of bitumen intended to fix plutonium in the soil. The report is definite. It will even be confirmed Tuesday on the rostrum of the National Assembly by the Minister of Defense himself who, contrary to the union, will swear, cross my heart, that no trace of contamination of the water has been observed until now.

But there is something more serious. Still according to the CFDT, the successive underground firings--six, it is reported since Francois Mitterrand took over the government--allegedly caused a collapse of the atoll of 2 centimeters for each explosion and that since the beginning of underground tests in 1975.

Of course, in the Ministry of Defense--with the minister being strangely silent on this point--it is assured there is no serious risk there. But, is this so certain? LE POINT can assert unequivocally today, in any case, that Mururoa is actually sinking and in an alarming manner. The most authoritative AEC experts have even confirmed "a sinking of a meter in the vertical direction of each firing" of the coral reefs surmounting the basalt of the old volcano, whose summit forms Mururoa atoll. "These successive shocks" cause landslides "amounting to 100 million cubic meters of earth: real "piston strokes" which can lead on the return to waves of "5 to 6 meters," mini-tidal waves capable there also of tearing away the plutonium from its matrix of bitumen.

Moreover, the phenomenon is so alarming that the AEC administration of military applications has considered here and now "a change of methods" in the subject of nuclear firing (which obviously would be more expensive). It may even involve a possible change of location to be able to continue to test the French "bomb."

8490
CSO: 3100/2066

PRIME MINISTER: SWEDEN SHOULD NOT ENRICH URANIUM FUEL

Stockholm SVENSKA DAGBLADET in Swedish 13 Dec 81 p 6

/Article by Claes-Goran Kjellander and Willy Silberstein: "'We Should Refrain From Reprocessing'"/

/Text/ "There is increasing argument that Sweden should refrain from reprocessing spent nuclear fuel and instead concentrate on safe direct final storage.

This is what Prime Minister Thorbjorn Falldin says in a SVENSKA DAGBLADET interview. He is worried about reports that the United States has begun to use spent fuel for the production of nuclear weapons.

"Today, I see no safe solution for us," he says.

And the conclusion of this must therefore be that Sweden should keep its waste within its own borders.

"For my part, I'm not surprised," Thorbjorn Falldin says. "I have often warned against the connection between spent fuel and the production of nuclear weapons. Unfortunately, much indicates that I will be proved right."

[illegible] skepticism

The technical problems at Ringhals, where radioactive water leaks out to the wrong part of the reactor, are also regarded by Thorbjorn Falldin as a sign that the skepticism attitude toward Alternative 3 before the nuclear power referendum was justified:

"If one were to believe everything said at that time about the almost invulnerable technology of the Swedish nuclear power plants, an event like this would not be possible."

"What has happened shows how important it is that Sweden should abolish nuclear power as soon as possible."

Prime Minister Falldin has noted that now there are no longer any divided opinions within the Nuclear Inspection Agency. The SKI /National Nuclear Inspection Agency/ has sounded the alarm internationally and spoken out in completely plain language.

"What we are now experiencing at Ringhals is also well in accordance with the criticism for sloppiness and lack of precision leveled by the new head of the nuclear power agency in the United States against plant builders in the United States."

The risk of spreading nuclear weapons to more nations is now increasing as a direct result of the technical development. More and more nations are acquiring the knowledge necessary for manufacturing nuclear weapons.

"All of the decisive responsibility rests with the superpowers, however," Thorbjorn Falldin believes. "Only if they realize that one cannot constantly raise the level of the terror balance will one be able to control the arming."

"This requires that the superpowers have confidence in one another, and that control over the disarmament becomes effective."

The submarine intermezzo does not lack importance -- it provided us with information about how terrifyingly close to our territory the nuclear weapons exist. But Thorbjorn Falldin refuses, despite all, to draw the conclusion that all Soviet submarines are equipped with nuclear warheads.

"That would be horrible. It would mean that from the beginning the decision had been made that an armed conflict would lead to nuclear war."

11949
CSO: 5100/2069

PAPER URGES CONTINUED STUDY ON SPENT FUEL ALTERNATIVES

Stockholm SVENSKA DAGBLADET in Swedish 15 Dec 81 p 2

/Editorial: "Falldin's Worry"/

/Text/ In a SVENSKA DAGBLADET interview last Sunday, Prime Minister Falldin took up the question of dealing with the waste from nuclear power.

For we cannot escape it. Swedish reactors produce waste, and the waste must be taken care of. Moreover, the problem would have existed even if Alternative 3 had won in the popular referendum. One cannot do away with the waste by magic -- not even waste from six reactors used for only 10 years after 1980.

It is good that this insight has now gained a foothold among nuclear power opponents.

As is known, there are two alternative ways of dealing with the spent fuel. It can be preserved directly, after a few years' storage. It can be reprocessed, which makes it possible to recover a certain amount and results in better economy and less volume of waste for final storage.

In Sweden both methods have been analyzed and planned in detail. According to the law of conditions, the nuclear power companies had to prove that they were able to arrange final storage in either manner. This led to the so-called KBS /Nuclear Power Safety/ Projects I and II. The reactors which were started up in accordance with the law of conditions -- that is to say after number six -- did so by invoking KBS I, that is to say the reprocessing alternative.

Consequently, plans are for the waste from Swedish reactors to be reprocessed before final storage.

However, in Sunday's interview the prime minister expressed great doubts about reprocessing and instead advocated so-called direct storage.

Falldin refers to the connection with nuclear weapons. (Poor) nuclear bombs can be made from plutonium extracted from reprocessed nuclear fuel. To be sure, this was already known. But Falldin is worried about reports from the United States that one has begun to use the reprocessed fuel to produce nuclear weapons.

To this might be said that the decisive criteria for whether Sweden should begin making nuclear weapons are made up of entirely different considerations, namely, primarily, the political decision. Sweden has signed the nuclear non-proliferation treaty.

Should Sweden at some point get a political leadership which wishes to force through a Swedish betrayal of this international obligation, one would in all certainty not take a detour through nuclear fuel in order to make nuclear weapons. For a nation which is sufficiently advanced technically (and Sweden is such a nation) these can be produced in a much cheaper and more efficient manner, that is to say through production with a direct military focus from the beginning.

The world has now progressed so far that neither the supply of knowledge nor the supply of raw materials limit the manufacture of nuclear weapons. The nuclear weapons issue is far more political than technical.

Swedish nuclear waste sealed in bedrock is and remains rather insignificant in comparison with the world's resources of ready-made nuclear weapons and first-rate nuclear explosives.

We probably still have the possibility of weighing, quite unemotionally, the technical and economic pros and cons of the two principal methods of storing spent nuclear fuel.

11949
CSO: 5100/2069

BRIEFS

MORE IODIDE TABLETS DISTRIBUTED--On Monday the National Health and Social Welfare Board began mailing out iodide tablets to all households within the so-called preparedness zones around the nuclear power plants of Barseback, Oskarshamn, Forsmark and Ringhals. Included with the 20 tablets are also instructions on how to behave in an emergency: "Measures During Alarm From the Nuclear Power Plant," the pamphlet is called, which the SSI, the Radiation Protection Institute, has included. In addition, the provincial government of the four nuclear power regions, Halland, Malmohus, Kalmar and Uppsala, have worked out local pamphlets with tips on telephone numbers, evacuation routes, signals, etc. The packages contain 2 x 10 tablets and may be stored for a limited time of 2 years, says Per Manell, head of the health division of the Health and Social Welfare Board, which is mainly responsible for mailing the iodide tablets. These are packed in Lund and are being mailed from there beginning this very week. Within a few days everyone who is supposed to have the tablets will also have received them. The tablets are mailed bulk rate. The iodide tablet distribution is a result of the parliamentary decision last year to increase preparedness for accidents at the nuclear plants. In addition to these packages of tablets, many different projects to increase safety have already been implemented at the nuclear plants. Safety is to be increased on more than 40 different points. Among other things, ventilation systems are being rebuilt, and so-called filter chambers are planned for collection of radioactive gas in case of a core meltdown. [Text] [Stockholm SVENSKA DAGBLADET in Swedish 8 Dec 81 p 6] 11349

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ENERGY MISC, NUCLEAR POLICY DEVELOPMENTS

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German Nov 81 pp 597-601

[Article by P. Hohl, Graduate Engineer, ETHZ (Federal Technical College of Zurich), technical assistant to the management of the division "electricity generation," BBC (Brown, Boveri, & Cie), CH-5401 Baden: "Situation of and Prospects for Nuclear Energy in Switzerland"]

[Text] In Switzerland, the future of its energy supply and thus that of nuclear energy depends on decisions which must be taken soon exclusively on a political level. Following the rejection of the so-called "nuclear-power initiative" by the Swiss people in February 1979 and the adoption 3 months later of the amendment to the Atomic-Energy Law, now no nuclear power plant can be constructed unless a general permission is granted and a proof of need is furnished. The Federal Energy Commission (EEF), which was set up by the Bundesrat [Executive Federal Council], published a report in February 1981 which is supposed to give the authorities criteria for making decisions on this proof of need. In its exposition, the EEF relied on two works published in 1979: The report by the Federal Commission for the Total-energy Concept "The Swiss Energy Plan," and the so-called "Ten-Company Report" of the Association of Swiss Electricity Works. Among other conclusions, both studies came to the finding that following the initial startup of Leibstadt, Switzerland's ability to meet the electricity demand by the middle of the 1990's will not be ensured with reasonable certainty without the operation of two additional 1,000-MW nuclear power plants.

Developments up to 1981

To be sure, the pluralistically organized Swiss electricity sector, with a full awareness of its responsibility, has always known how to control the growth of production capacities in such a way that neither the citizens nor the economy ever had to suffer from shortages, and yet they have been able to profit from favorable rates compared to the rest of Europe. According to some new legislation, now the responsibility for this task--which in principle is a technical-economic one--is to be assumed by the Bundesrat and the members of the Swiss parliament, at least as far as this concerns the currently most economical solution, namely nuclear power plants. And in their decisions these bodies are unlikely to be able to ignore public opinion, which is subject to manipulation. How could things have come to such a pass that the future of nuclear energy fell into the hands of the politicians in this way?

After the last world war, the electricity sector had to meet the increasing demand for electricity by energetically stepping up the construction of water power utilization, until at the end of the 1950's the maximum ecologically tenable limit of hydroeconomy and with reference to environmental damage began to loom on the horizon. To take the place of water power, at first here and there fossil-fired thermal power plants were planned. With good reason, these projects met with a growing resistance from the population, which had been alerted to the emissions which could be expected, so that finally only the 280-MW oil power plant of Vouvry could be built (initial startup in 1966/67).

Therefore, the commercial breakthrough of nuclear energy was welcomed by the economy and by conservation circles in particular. The federal authorities, on their part, set to work, and by 1959 they had already passed the Atomic Energy Law (accepted by the people in 1960). Among other things, this law made construction permits and safety conditions for nuclear power plants (NPP's), as well as radiological protection, quite generally an affair of the federal government. From 1960 on the government resolutely placed its hopes in nuclear energy, a decision which in retrospect, in light of the later petroleum-price shocks, was to prove to be economically correct as well. Practically without any resistance and after a very short construction time, the electricity sector was able to put into operation between 1969 and 1972 the NPP's of Beznau-1 and II north of Baden, which were still cooled by river water, and Muehleberg west of Bern (Table 1). Two units, one of the 1,000-MW class, were started on the Gosgen, Kaiseraugst, Leibstadt, Verbois, Graben, Inwil, and Ruethi.

Swiss industry had not remained idle. One group of companies started to take part in reactor developments quite early on, building in the 1960's, with governmental assistance, the 10-MWe pilot plant of Lucens, although serious problems soon put an end to its reach. Today the relevant exporting industry limits itself to the construction of important NPP components such as steam turbine-groups, steam generators, pressure vessels, measuring instruments, and so forth. Engineering companies likewise have developed a good reputation in terms of designing and constructing nuclear facilities, and these outfits profit from the neutral position of Switzerland with respect to reactor technology.

Meanwhile, a strong resistance began to take shape which was open or latent and in some cases also anti-industry oriented. Parts of the population, especially in northwestern and western Switzerland, were confronted with one-sided, biased reporting or even false reports by the mass media and had been exposed to extremist-political groups. As happened in the USA and in Sweden, the nuclear energy controversy kindled in the United States also produced effects in Switzerland. The first time matters came to a head was in 1971 when the building permit for the power-plant grounds of Kaiseraugst in the vicinity of Basel was withdrawn. Because of this, the rattled authorities began to delay the granting of subsequent permits, so that since then it has proved possible to put into operation only the NPP of Goesgen, between Olten and Aarau, at the end of 1979, as well as the one on the confluence of the Aare and the Rhine, so that we are now considerably behind schedule.

For its part, the electricity sector has not remained idle at the critical time. Thus, two groups with participations in nuclear power plants signed long-term electricity orders from the French nuclear program, namely for the two units of Bugey. Furthermore, the NPP operating companies, grouped in the Association of Swiss Nuclear Power Companies on uranium procurement, entered the [illegible] and [illegible]

[illegible]

[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible] The addition of [illegible] represents a doubling of the supply existing in 1980 from [illegible]

For the protection of the country's economic [illegible] the electricity supply must be guaranteed at all times, and for this purpose domestic [illegible] production capacities are needed. [illegible]

[illegible]

At the end of 1981 the Federal Office of Energy Economics published a new situation report about the effects on water bodies from the cooling of thermal power plants. Despite intervention by the local cantons--the river water cooling of the NPP's of Beznau and Muehleberg has not given rise to any adverse consequences since starting operations--the report essentially confirms the cooling-tower decision of 1971. At all events, a river-water cooling tower mixed operation or a dry cooling tower are both permissible.

Facts

Table 3 gives information about the connection between economic development and energy consumption in the last 30 years. In the wake of the first oil crisis, the overall energy consumption changed roughly in parallel with the markedly slowed economic activity (gross domestic product in real-value terms). But in Switzerland the desirable disassociation is not yet in sight. In spite of the recession, the electricity consumption rose even more in 1973/80 than in the period 1950/73, and even a good deal more than all the stated predictions estimated. It seems that despite appeals to savings, the Swiss people do not believe in a possible future electricity shortage. On the contrary, already one can discern a substitution effect caused by energy prices, in that--among other things--about 20 percent of the increase in demand in the housing sector is due to new electrical heaters. Thus the principle "electricity saves on heating oil without causing economic shipwreck" [9] has been confirmed. Such findings take on their full significance in assessing the "proof of need." To be sure, these findings are deliberately ignored by the opponents of nuclear energy--on the contrary, they are intensifying their call for government prohibitions.

Thanks to a conscientious operational management, good equipment, and a responsible [illegible] order on safety, the Swiss NPP's have achieved excellent operational results so far. For many years now, Beznau I/II and Muehleberg have been on the world's list of the 10 best plants, with an operational utilization of over 80 percent. Goesgen as well has had an outstanding start. The increasing share of domestic electricity generation held by nuclear energy can be seen in Table 4. It reached more than 36 percent in the winter half-year of 1980/81, which at that time made it the leader of all states.

If generation and consumption are compared, it is discovered that even had there been no electricity exporting, in each of the last 11 winter half-years there would have been an average electricity shortfall of about 20 percent if nuclear energy had not stepped into the breach. To have switched to steady imports, fossil-fuel thermal power plants, or electricity rationing would scarcely have been possible. This situation will become even more critical in the future. By the way, Table 4 also clearly shows how electricity generation from water power markedly fluctuates from year to year (compare for example 1974/75, 1975/76, and 1976/77, with practically the same capacity).

In terms of the viewpoints of the GEK, by the year 2000 about 40 percent of the yearly electricity generation should be based on nuclear energy, but water power should still account for half. Nevertheless, in the overall energy supply of the country, any predominance of nuclear energy is out of the question. Indeed, at that time it is likely to have acquired at most a share of 15 percent at the ultimate energy stage.

Table 1: Changes in the Ultimate Energy Consumption and the Gross Domestic Product in Switzerland Since 1950.

Average annual growth rates (% per year) per capita of the population and consumption elasticities[1)]

Period	Real GNP	Total Energy		Heating fuels		Motor fuels		Electricity	
	Growth	Growth	Elasticity	Growth	Elasticity	Growth	Elasticity	Growth	Elasticity
1950-1980	2.4	3.65	1.5	2.9	1.2	6.7	2.8	3.4	1.4
1950-1973[2)]	3.15	4.75	1.5	4.1	1.3	8.45	2.7	3.5	1.1
1975-1980	1.25	2.2	1.75	1.35	1.1	2.75	2.2	4.05[3)]	3.25

[1)]The elasticity is the ratio between the average growth in energy consumption and the average growth in the real gross domestic product (GNP).

[2)]Between 1973 and 1975, after the oil shock both energy consumption and the GNP decreased because of the recession; this dip is taken into account in the figures of the period 1950-1980.

[3)]Winter half-year 1975/76-1980/81: 4.25 percent.

Future Energy Policy

On 21 September 1981, the Bundesrat consented to an additional nuclear power plant in the 1990's. On the other hand, it said that it is not yet in a position to conclusively deal with the application for a general permission for Kaiseraugst. Instead, it is inviting the Kaiseraugst Nuclear Power Plant AG to submit a proposal for a waiver. For its part, this company has made known the conditions under which it would be prepared to withdraw the application. In particular, it cannot see its way to assuming partial responsibility for any later electricity-consumption shortfall because of a retreat without an alternative, or to giving up its legal position without a concrete concession by the Bundesrat on the question of indemnification.

The years 1981 and 1982 are the years for setting a new course. As concerns the political resolution of the waste-disposal problem--an additional constituent of the general permission regulation--special efforts will be needed in order to put into effect the research program of the National Association for the Storage of Radioactive Wastes (Nagra), which was formed for this purpose by the outfits which generate radioactive wastes. For some time now, 12 applications to conduct exploratory borings to investigate the primary rock in the Jura region of Olten-Schaffhausen have been waiting to be approved by the Bundesrat.

Even before granting the expected general permission for the next nuclear power plant, the Bundesrat presented to parliament a communication concerning having an energy article in the Federal Constitution, because up to now the Constitution has made do without such an energy article. In this area it is asking for national jurisdiction in three respects:

1. Basic standards for the economical and efficient use of energy, with a clear separation of powers between the Federal Government and the cantons,

Table 4: Domestic Electricity Generation in Switzerland, Shares From Nuclear Power Plants

Hydrological year 1 Oct.-30 Sept.	Total Generation[1] GWh		Generation by NPP's[1] GWh		Share from NPP's[1] %		Start of Operation of the NPP's
	Year	Winter half-year	Year	Winter half-year	Year	Winter half-year	
1969/70	33173	14026	1989	1089	6.0	7.8	Beznau-I
1970/71	32785	15897	1300	804	4.0	5.1	
1971/72	31300	14161	3590	1453	11.5	10.3	Beznau-II
1972/73	36538	16884	6273	3740	17.2	22.2	Muehleberg
1973/74	37248	17904	6159	3298	16.5	18.4	
1974/75	42282	18488	7373	4206	17.4	22.8	
1975/76	36111	18931	7470	4218	20.7	22.3	
1976/77	45360	19835	7646	4360	16.9	22.0	
1977/78	43374	20836	7969	4466	18.4	21.5	
1978/79	42194	19060	9379	4650	22.2	24.4	Goesgen
1979/80	49534	24589	13643[2]	7934[2]	27.6	32.3	
1980/81		22934		8331[3]		36.4[3]	

Month				Import surplus, GWh
Dec. 1978	299	771	25.8	+426
Dec. 1979	390	1389	35.5	-550
Dec. 1980	3690	1441	39.1	+ 36

[1] Not including components of the Swiss participation in the French NPP's of Fessenheim and Bugey (these are covered by the statistics as a part of the imports).

[2] Operational utilization 1979/80: For the whole year 80.5 percent, for the winter half-year 93.5 percent.

[3] Winter half-year of 1980/81: Largest share of all states, operational utilization of 98 percent.

2. Uniform regulations concerning the energy consumption of facilities, vehicles, and equipment,

3. Promotion of the development of techniques which are conducive to the economical and efficient use of energy, the utilization of new energies, and a broad variety of energy-supply solutions.

An energy levy tied to specific purposes (recommendation by the GEK) should be dispensed with, and in its place those sources of energy which have been exempt hitherto from the sales tax should be included in this tax.

The efficiently operating energy sector, whose organization is in part completely private (petroleum, coal) and in part that of mixed ownership (electricity, natural gas), should continue to be responsible for production and distribution. Nuclear energy itself is not mentioned by name. But its importance lies in the expressions "broad variety" and "efficient."

Moreover, also in preparation is the overall revision of the 1959 Atomic-Energy Law, since the validity of the 1979 amendment is to expire at the end of 1983. A relaxing of the regulations can hardly be expected for the time being--indeed, the commission of experts which was charged in 1975 with this revision recently submitted a preliminary draft which a noted daily newspaper assessed with the headline "almost a 'no' to nuclear energy."

The discussions about the draft of a constitutional article are under way. Industry regards this as hardly necessary; on the other hand, to the environmental organizations it does not go far enough. Following deliberation in the Federal parliamentary bodies, it must be submitted to the people and cantons for a decision. The coming years will show how seriously the Swiss people take the warnings of the oil sheiks. And the future of nuclear energy will depend on this. The deciding factor is the discernment of each citizen, because a high quality of life presupposes that the nation has also in its energy sector certain infrastructures which one not only can make use of, but also has to tolerate.

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